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PAPER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/813,789
Filing Date: March 26, 2004
Appellant(s): GAO ET AL.

Gerald Mahszewski
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 21 May 2007 appealing from the Office
action mailed 4 April 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

| | | |
|-----------|----------------|---------|
| 6,781,762 | Ozawa | 08-2004 |
| 6,211,916 | Hawkins et al. | 04-2001 |
| 6,307,243 | Rhodes | 10-2001 |

Art Unit: 1763

2004/0082094

Yamamoto

04-2004

2003/0157211

Tsunetomo et al.

08-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-11, 13, 17, 20, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,781,762 to Ozawa.

In regards to Claims 1 and 21, Ozawa teaches a method of forming a microlens structure comprising: providing a transparent material 210a; forming a hard mask 220' overlying the transparent material; patterning an opening in the hard mask (Column 15, Lines 10-13); and forming a lens shape 500 by etching the hard mask 220' and the transparent material 210a using an isotropic wet etch that etches the hard mask faster than the transparent material (Column 15, Lines 3-6 and 13-14), whereby the hard mask is etched laterally to expose a larger area of the underlying transparent layer as the etch proceeds (Column 15, Lines 14-24). (Figures 12a-12f; Column 14, Line 46 - Column 15, Line 65) The hard mask is 220' is *partially* removed by this lateral etching process, *as broadly recited in the claims.*

In regards to Claim 2, Ozawa further teaches filling the lens shape with a lens material 230. (Figure 12f; Column 15, Line 66 - Column 16, Line 6)

In regards to Claim 3, the transparent material 210a can be silicon oxide. (*quartz*; Column 14, Lines 46-47)

In regards to Claim 4, the transparent material can also be an optical resin. (Column 3, Lines 40-41)

In regards to Claim 5, the isotropic wet etch can be an HF etch. (Column 15, Lines 4-5)

In regards to Claim 6, the lens material 230 has a higher refractive index than the transparent material 210a. (Column 16, Lines 6-10)

In regards to Claim 7, Ozawa teaches that the lens material 230 can be an optical resin (thermosetting transparent adhesive; Column 15, Line 66 - Column 16, Line 1), as broadly recited in the claim.

In regards to Claims 8-10, Ozawa teaches forming an AR coating 200 of quartz glass overlying the lens material, as broadly recited in the claim. (*cover glass 200*; Figure 12f; Column 16, Lines 1-3)

In regards to Claims 11 and 13, Ozawa teaches planarizing the lens material 230, as broadly recited in the claim. (the lens material is planarized when it is pressed by cover glass 200; Figure 12f; Column 15, Line 66 - Column 16, Line 12)

In regards to Claim 17, the opening 220a in the hard mask 220' has non-vertical side walls (Figure 12c).

In regards to Claim 20, the transparent layer can be provided overlying a substrate 10 having a photodetector 9a formed thereon. (Figure 11; Column 13, Lines 59-63)

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa in view of U.S. Patent 6,211,916 to Hawkins et al.

The teachings of Ozawa were discussed above.

Art Unit: 1763

In regards to Claim 12, Ozawa does not expressly teach that planarizing the lens material comprises chemical mechanical polishing.

Hawkins et al. teaches that planarizing a lens material 130 comprises chemical mechanical polishing. (Column 5, Lines 25-26)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Ozawa to have planarizing the lens material comprise chemical mechanical polishing, as taught by Hawkins et al. The motivation for doing so, as taught by Hawkins et al. (Column 5, Lines 25-26), would have been to planarize the lens material optically flat.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa in view of U.S. Patent 6,307,243 to Rhodes and U.S. Patent Application Publication 2004/0082094 to Yamamoto.

The teachings of Ozawa were discussed above. Ozawa further teaches that the hard mask 220' can be silicon oxide formed by CVD (Column 14, Lines 50-52) and the transparent material 210a can be silicon oxide. (Column 14, Lines 46-47)

Ozawa does not expressly teach that the silicon oxide hard mask, formed by CVD, can be TEOS oxide.

Rhodes teaches that a silicon oxide layer 72 formed by CVD can be TEOS oxide (TEOS is used as the silicon source; Column 6, Lines 6-18)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Ozawa to have the silicon oxide hard mask be TEOS oxide. The motivation for making such a modification, as taught by Rhodes (Column 6, Lines 6-18),

Art Unit: 1763

would have been that using TEOS as the silicon source in a CVD process to form a silicon oxide layer results in improved conformal deposition.

Ozawa also does not expressly teach that the transparent material can be thermal oxide.

Yamamoto teaches that a transparent material 305 located below microlenses 313 can be thermal oxide. (Paragraph 23)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Ozawa to form the transparent material of thermal oxide, as taught by Yamamoto. The motivation for doing so would have been to form the oxide by a blanket deposition. Moreover, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa in view of Hawkins et al. as applied to Claim 12 above, and further in view of U.S.

Patent Application Publication 2003/0157211 to Tsunetomo et al.

The teachings of Ozawa and Hawkins et al. were discussed above. Ozawa further teaches that the transparent material 210a is undoped silicon oxide (*quartz*; Column 14, Lines 46-47)

In regards to Claim 16, the combination of Ozawa and Hawkins et al. does not expressly teach that the hard mask 220' is a doped silicon oxide.

Tsunetomo et al. teaches a hard mask 28 of a doped silicon oxide (a *predetermined amount of F is added into a SiO₂ layer to form a fluoridated SiO₂ layer* 28) is formed on a transparent layer 26 of undoped silicon oxide. (Paragraph 71)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Ozawa and Hawkins et al. to form the hard mask of a doped silicon oxide, as taught by Tsunetomo et al. (Paragraphs 71-74), would have been that the etching rate of the doped silicon oxide relative to the undoped silicon oxide can be set so as to attain concave etched portions having a desired shape.

Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa in view of U.S. Patent Application Publication 2003/0157211 to Tsunetomo et al.

The teachings of Ozawa were discussed above. Ozawa further teaches that the transparent material 210a is undoped silicon oxide (*quartz*; Column 14, Lines 46-47)

In regards to Claims 18 and 19, Ozawa does not expressly teach that the method further comprises providing a second transparent material overlying the transparent material and below the hard mask, and having a faster etch rate than the transparent material.

Tsunetomo et al. teaches that a transparent layer 20 to be etched can comprise a plurality of layers of transparent material, each formed of silicon oxide doped with a different amount of fluorine, such that each layer has a faster etch rate than the layer below it (Figure 6). (Paragraphs 29, 61, 62)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Ozawa to form the transparent material to be etched of a plurality of layers of transparent material (thus comprising at least a second transparent material), each layer formed of silicon oxide doped with a different amount of fluorine, such that each layer has a faster etch rate than the layer below it, as taught by Tsunetomo et al. The motivation for doing so, as taught by Tsunetomo et al. (Paragraphs 49 and 64), would have been to produce a lens array each having an aspherical shape.

(10) Response to Argument

Specifically, in regards to Applicant's argument that layer 220' of Ozawa does not constitute a hard mask as broadly recited in the claim, the Examiner must disagree. Layer 220' performs the function of a hard mask as would be understood by one of ordinary skill in the art, in that it is a hard layer that is patterned and used as a mask for etching. It is considered that the recitation of a hard mask would be understood by one of ordinary skill in the art to refer to a masking layer that is patterned and used as a mask for etching, i.e. to refer to the function the layer is to perform, not to refer to a layer that must necessarily be completely removed after being used as a patterned mask.

The term "hard mask" has received no special definition in Applicant's disclosure to indicate that the term "hard mask" must be interpreted "a mask that is *always* removed after the etching process is complete." The layer 220' of Ozawa performs the same function as Applicant's disclosed hard mask, that is, a hard layer that is patterned and used as a mask for etching. Moreover, just because Ozawa does not term layer 220' as a "hard mask," does not obviate the fact that layer 220' performs as a hard

Art Unit: 1763

mask, and thus meets the recitation in the claims of a hard mask. It has been held that during patent examination, the pending claims must be "given the broadest reasonable interpretation consistent with the specification." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969) Also, the words of the claim must be given their plain meaning unless Applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)

In response to Applicant's argument that the references fail to show certain features of Applicant's invention, it is noted that the features upon which Applicant relies (i.e., that Ozawa does not teach that *all* of the hard mask layer 220' is removed after the wet etching step) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The recitation of "removing the hard mask" has been given the broadest reasonable interpretation of requiring the removal of hard mask material, which step is taught by Ozawa. Again, it has been held that during patent examination, the pending claims must be "given the broadest reasonable interpretation consistent with the specification." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05,

Art Unit: 1763

162 USPQ 541, 550-51 (CCPA 1969) Also, the words of the claim must be given their plain meaning unless Applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)

In response to Applicant's argument that it is unclear that a CMP process as taught by Hawkins could be incorporated in the method and structure taught by Ozawa, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In response to Applicant's argument that there is no specific suggestion or teaching in the Ozawa and Hawkins references themselves to combine their teachings, *KSR International Co. v. Teleflex Inc.*, 550 U.S.--, 82 USPQ2d 1385 (2007) forecloses the argument that a *specific* teaching, suggestion, or motivation is required to support a finding of obviousness. Examiner maintains that one of ordinary skill in the art at the time of the invention would have found it obvious, with a reasonable expectation of success, to modify the planarizing method taught by Ozawa to comprise a CMP step, as taught by Hawkins et al. (Column 5, Lines 25-26), in order to gain the benefit taught by Hawkins et al. of planarizing the lens material optically flat. Moreover, the use of a CMP step to planarize the lens material is considered to be an alternative planarizing method to that taught by Ozawa of compressing the lens material with plate member 210, which

Art Unit: 1763

one of ordinary skill in the art would find it obvious to employ with a reasonable expectation of success to obtain the predictable result of a planarized lens material.

In response to Applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Maureen G. Arancibia/

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Art Unit 1763

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